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IS 1221 (1991): Fountain Pen Ink - Dye Based [CHD 14: Printing, Inks, Stationary and Allied Products]



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भारतीय मानक

फाउन्टेन पेन की स्याही — रंग आधारित — विशिष्ट  
( दूसरा पुनरीक्षण )

*Indian Standard*

FOUNTAIN PEN INK — DYE BASED —  
SPECIFICATION

*( Second Revision )*

UDC 667.485

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**BUREAU OF INDIAN STANDARDS**  
**MANAK BHAVAN, 9, BAHADUR SHAH ZAFAR MARG**  
**NEW DELHI 110002**

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Price Group 2

## FOREWORD

This Indian Standard ( Second Revision ) was adopted by the Bureau of Indian Standards, after the draft finalized by the Stationery and Allied Products Sectional Committee had been approved by the Chemical Division Council.

Bright coloured dye based fountain pen inks, such as red, violet, green and blue are very popular because of their brilliant colours and ease with which their stains can be removed from hands and clothes. The writings produced with these inks are liable to fade away on exposure to bright light and by washing with water and alcohol. For permanent writings with fountain pens, iron based inks are used which are covered under IS 220 : 1988 Fountain pen ink, ferro-gallo tannate ( 0.1 percent iron content ) — Specification ( *third revision* ).

This standard was first issued in 1957. In the light of experience gained through its use by the industry and the consumers, the standard was revised in 1971 and the tests for corrosion, sedimentation and clogging were added. Since these inks are not meant to be resistant to washing, test for resistance to water and alcohol has been deleted. Since 1971, three amendments had been issued and in the present revision all the amendments have been incorporated.

In the original standard, the dye content was required to be determined on a colorimeter against reference ink made by using dyes of certain brand names. Since these dyes were subsequently not available in the country, appropriate colour index was specified for each dye. In the present revision the intensity of colour is required to be determined visually against reference ink prepared from indigenously manufactured dyes.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values ( *revised* )'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

# Indian Standard

## FOUNTAIN PEN INK — DYE BASED — SPECIFICATION

### ( Second Revision )

#### 1 SCOPE

This standard prescribes requirements and methods of sampling and tests for dye based fountain pen inks.

#### 2 REFERENCE

The Indian Standards listed below are necessary adjuncts to this standard :

IS No.	Title
1070 : 1977	Water for general laboratory use ( <i>second revision</i> )
1848 : 1981	Writing and printing papers ( <i>second revision</i> )
1945 : 1986	Glass bottles for fluid ink ( <i>first revision</i> )
4395 : 1987	Glossary of terms relating to inks & allied industries ( <i>first revision</i> )
4905 : 1968	Methods for random sampling
8642 : 1977	Dyes for water based writing inks

#### 3 TERMINOLOGY

For the purpose of this standard, the definitions given in IS 4395 : 1987 shall apply.

#### 4 COLOUR

4.1 The ink shall be of any or of the following colours : Blue, Green, Violet, Black and Red.

#### 5 REQUIREMENTS

##### 5.1 General

5.1.1 The ink shall be based on dyes and shall be suitable for use in fountain pens.

5.1.2 It shall be quick drying on paper and shall flow easily from the fountain pens.

5.1.3 It shall not feather on paper having one minute cobb test value equivalent to cream wove/cream laid paper ( *see* IS 1848 : 1981 ) or smudge or be sticky after drying on the writing paper.

5.1.4 It shall not produce any incrustation of dried dye on the fountain pen nib.

5.1.5 It shall be almost free from sediments.

##### 5.2 Intensity of Colour

The intensity of colour shall be at least equal to the reference ink prepared by dissolving the following quantities of dyes in distilled water ( the comparison shall be made visually in Nessler cylinders after 1 : 100 dilution ):

Colour of Ink	Dye	Weight of Dye in g in 100 ml of water
Blue Ink blue [ <i>see</i> Table 1, SI No. ( i ) of IS 8642 : 1977 ]		0.75
Green	Acid green [ <i>see</i> Table 1, SI No. ( ii ) of IS 8642 : 1977 ]	1.20
Violet	Acid violet [ <i>see</i> Table 1, SI No. ( iii ) of IS 8642 : 1977 ]	1.50
Black	Nigrosine [ <i>see</i> Table 1, SI No. ( iv ) of IS 8642 : 1977 ]	2.00
Red	Crocein scarlet Moo [ <i>see</i> Table 1, SI No. ( vi ) of IS 8642 : 1977 ] or Eosine [ <i>see</i> Table 1, SI No. ( vii ) of IS 8642 : 1977 ]	2.00

#### NOTES

- The dyes shall be essentially free from diluents and impurities.
- In case of ink blue, pH between 2.0 and 2.5 shall be maintained.
- In case of Eosine, fluorescence shall be neutralized by addition of 0.1 to 0.2 ml of 2 N hydrochloric acid for colour comparison.

5.2.1 The shade of the ink shall be as agreed to between the purchaser and the supplier.

##### 5.3 Stability

The ink shall pass the stability test prescribed in A-2.

##### 5.4 Corrosion

When tested as prescribed in A-3, the corrosion shall be not more than 5 percent.

##### 5.5 Penetration

Writing and stripes shall not penetrate unreasonably deep through paper having one minute cobb test value equivalent to cream wove/cream laid paper ( *see* IS 1848 : 1981 ).

## 5.6 Colour Uniformity and Intensity

When tested according to the method prescribed in A-4, the stripes shall be uniform in colour and intensity and there shall be no feathering of the stripes.

## 5.7 Resistance to Light

When tested according to the method prescribed in A-5, the stripes shall be no more affected in respect of resistance to light than those of the reference ink made from the appropriate dye in concentration recommended under 5.2.

## 5.8 Clogging

The ink shall be free from clogging when tested as prescribed in A-6.

## 5.9 Washability Test ( for Washable Inks )

The ink shall pass the test prescribed in A-7.

## 6 KEEPING QUALITY

The ink shall write well with a fountain pen without clogging for a minimum period of two years from the date of manufacture.

## 7 MARKING AND PACKING

### 7.1 Marking

Each bottle shall be marked with the following information :

- Name of the material followed by the words 'dye based' in parenthesis,
- Colour of the material,
- The word 'washable' in case of washable inks,
- Volume in ml in the bottle,
- Indication of source of manufacture, and
- Identification in code or otherwise to enable the lot and date of manufacture to be traced back from records.

### 7.2 Packing

Unless otherwise agreed to between the purchaser and the supplier, the material shall be filled in glass bottles conforming to IS 1945 : 1986.

## 8 SAMPLING

The method of drawing representative samples of the material from a lot, the number of tests to be performed and the criteria of finding the conformity of the material to the requirements of this specification shall be as prescribed in Annex B.

# ANNEX A

( Clauses 5.3, 5.4 and 5.6 to 5.9 )

## METHODS OF TEST FOR DYE BASED INKS

### A-1 QUALITY OF REAGENTS

**A-1.1** Unless specified otherwise, pure chemicals and distilled water ( see IS 1070 : 1977 ) shall be used in the tests.

NOTE — 'Pure chemicals' shall mean chemicals that do not contain impurities which affect the results of analysis.

### A-2 TEST FOR STABILITY

#### A-2.1 Apparatus

**A-2.1.1 Glass Beaker** — unlippped, 100 ml capacity.

#### A-2 Procedure

Take 50 ml of the ink in an unlippped beaker of 100 ml capacity. Mark the level of the liquid, cover it with a watch glass and leave for 15 days in a place uncontaminated by dust and chemical fumes. Examine for moulds and flakes after this period.

**A-2.2.1** Make up the volume with water and stir. Allow to stand for 24 h and filter. The ink shall remain non-gelatinous and shall leave no residue on filtration.

### A-3 DETERMINATION OF CORROSION

#### A-3.1 Apparatus

##### A-3.1.1 Brass Piece

Containing 60 percent copper and 40 percent zinc or equivalent, having the dimensions approximately 25 mm × 25 mm × 0.3 mm. All the surfaces of the brass piece shall be smooth and well polished.

#### A-3.2 Procedure

Thoroughly clean the brass piece with ethyl alcohol and ether. Dry at  $105 \pm 5^\circ\text{C}$  and weigh accurately to the nearest milligram. Suspend the brass piece by means of a silk thread in 50 ml of ink contained in a beaker. Keep it completely immersed and without touching the beaker for 7 days at room temperature. The beaker shall suitably be covered during all this period. After 7 days remove the brass piece, wash with water and wipe with soft lint-free cloth. Rinse with alcohol and dry as before to constant weight.

#### A-3.3 Calculation

$$\text{Corrosion, percent} = 100 \times \frac{M_1}{M}$$

where

$M_1$  = loss in mass in g of the brass piece, and

$M$  = mass in g of the brass piece taken for the test.

## A-4 TEST FOR COLOUR UNIFORMITY AND INTENSITY

### A-4.1 Procedure

Place a sheet of paper having one minute cobb test value equivalent to cream wove/cream laid paper (see IS 18:8 : 1981) with the felt side upwards and slightly stretched, on a piece of board or glass plate with a smooth surface. Adjust the board or glass plate so that the surface of the paper makes an angle of  $45^\circ$  with the vertical. Draw up one millilitre of ink in a 1-ml pipette and allow the nozzle just to touch the paper near the top edge, the pipette remaining vertical. Release the ink carefully to form a perfect stripe of uniform width across the paper.

**A-4.1.1** The stripe shall not be wavy and there shall be no feathering. The intensity of the stripe shall be uniform throughout and not variable at different places.

**NOTE** — When arranging the sheet of paper for making the stripes it is desirable to place it so that the ink will flow in the machine direction. There is a slight but definite difference in the arrangement of the fibres in the machine direction and at right angles to it. If a piece of paper about 25 mm square is laid on water, in a moment or two it starts to curl up on two opposite edges and thus makes a shallow trough. The axis of the trough is parallel to the machine direction of the paper. If the ink flows across the machine direction the paper will become wrinkled across the stripes, these will then be unevenly coloured.

## A-5 TEST FOR RESISTANCE TO LIGHT

### A-5.1 Daylight Exposure

#### A-5.1.1 Procedure

Dry the stripe prepared in A-4.1 for 15 minutes and remove it from the board. Cut off a stripe of a paper 4 cm in width from the bottom of the sheet at right angles to the stripe and reject it. Cut the remaining paper into stripes, each 5 cm wide and at right angles to the stripes for 8 days to air and diffused daylight in the shade. At the same time and under the same conditions, perform the experiment with the reference ink (see 5.2).

**A-5.1.1.1** Dilute the ink and the reference ink with an equal volume of water and repeat the experiment.

**A-5.1.1.2** The stripes of the ink shall show a close match to those of the reference ink and the stripes of the diluted ink shall show a close match to those of the diluted reference ink.

## A-5.2 Ultra-Violet Ray Exposure

### A-5.2.1 Procedure

Place the papers containing the stripes from ink and the reference ink at a distance of 25 cm from an ultra-violet lamp (see A-5.2.1.1) normal to the rays, and expose for a total period of 36 h. Expose the papers containing the stripes from diluted ink and diluted reference ink in the same manner but for a total period of 27 h.

**A-5.2.1.1** The ultra-violet lamps shall be of 125 watts and of long wave UV region chiefly at  $3655^\circ \text{A}$ .

**A-5.2.1.2** The darkness (intensity) of the stripes from the ink and the diluted ink shall be at least equal to that of the stripes from the reference ink and the diluted reference ink respectively.

## A-6 TEST FOR FREEDOM FROM CLOGGING

### A-6.1 Procedure

Fill a fountain pen which is known to be in good working condition (see A-6.1.1) with the ink. Replace the cap and allow it to remain in vertical condition with the nib upwards for 5 days at ambient room temperature. After this period, write with the pen on writing paper.

**A-6.1.1** The pen shall be considered to be in good working condition if it satisfies the writing test prescribed below:

The pen when fully filled with the ink at room temperature shall be capable of writing at a normal speed of hand-writing, continuous flourishes on a cream laid and cream wove or super calendered paper (see IS 18:8 : 1981) in the 'shape of 8' the pen being lifted after each row, the flow of ink shall be continuous and not blotchy and writing shall commence at the point where the nib touches the paper.

**A-6.1.2** The ink shall be regarded as free from clogging effect if the pen starts to write without undue pressure and without stopping or other impairment in the inkflow.

## A-7 TEST FOR WASHABILITY (FOR WASHABLE INKS)

### A-7.1 Material

**A-7.1.1 Cotton** — bleached cotton sheeting free from filling and dressing.

**A-7.1.2 Wool** — an all wool unraised cloth, clean scoured free from filling or any other admixture.

**A-7.1.3 Soap Solution** — prepared by dissolving 5 g of laundry soap in 1 000 ml of distilled water, heating gently, if necessary.

### A-7.2 Procedure

**A-7.2.1** Cut the fabric into squares  $5 \text{ cm} \times 5 \text{ cm}$ . From a clean medicine dropper, place one drop



of ink on each of six pieces of each fabric. Allow the pieces to dry for one hour by suspending them in the air at room temperature.

**A-7.2.2** Immerse the cotton and wool pieces in successive changes of water at room temperature until no further colour bleeds out. Place the pieces in a beaker containing soap solution. Raise the temperature of the solution to 50°C and maintain

at that temperature for 30 minutes. Rinse the pieces in water and dry by suspending in air at room temperature.

**A-7.2.3** The ink shall be considered to have passed the test if it is at least as washable as the reference ink prepared with the appropriate dyes mentioned in 5.2 in concentration specified against each.

**A N N E X   B**

( Clause 8 )

**SAMPLING OF DYE BASED FOUNTAIN PEN INKS**

**B-1 GENERAL REQUIREMENTS OF SAMPLING**

**B-1.0** In drawing, preparing, storing and handling test samples the following precautions and directions given in **B-1.1** to **B-1.4** shall be observed.

**B-1.1** Samples shall be drawn from originally unopened bottles.

**B-1.2** Samples shall not be taken in an exposed place.

**B-1.3** Unless otherwise stated, in any test method sample ink from each of the selected bottles shall be drawn after shaking and then allowing the fluid to come to rest.

**B-4** Each of the sample containers shall be marked with full details of sampling and the month and year of the manufacture of the material.

**B-2 SCALE OF SAMPLING**

**B-2.1** All the bottles in a single consignment of the material and containing ink of the same type, colour and composition shall be grouped together to form a lot.

**B-2.2** Samples of dye based fountain pen inks shall be tested from each lot separately for ascertaining the conformity of the material to the requirements of the specification.

**B-2.3** The number of bottles ( *n* ) to be chosen from the lot depends upon the size of the lot and shall be in accordance with Table 1.

**Table 1 Number of Bottles to be Selected for Sampling**

Lot Size	No. of Bottles to be Chosen
<i>N</i>	<i>n</i>
Up to 25	3
26 to 50	4
51 to 100	5
101 to 300	7
301 to 500	9
501 and above	19

**B-2.4** These bottles shall be chosen at random from the lot. In order to ensure randomness of selection some random number table may be used. For guidance to random selection procedures, reference may be made to IS 4905 : 1968.

**B-3 NUMBER OF TESTS**

**B-3.1** Ink from each of the selected bottles shall be tested for general requirements ( 5.1 ).

**B-3.2** For testing all the other characteristics, a composite sample shall be prepared by mixing equal volume ( about 40 ml ) of ink from each of the selected bottles. From this composite sample, required quantity of ink shall be drawn for conducting various tests prescribed in 5.2 to 5.9.

**B-4 CRITERIA FOR CONFORMITY**

**B-4.1** The lot shall be declared to have complied with the requirements of the specification if all the individual samples ( **B-3.1** ) and the composite sample ( **B-3.3** ) pass the relevant tests.

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